Roll No.   **Total No. of Pages : 02**

Total No. of Questions : 18

B.Tech. (CSE/IT) (2012 Onwards) (Sem.–4)

DISCRETE STRUCTURES

Subject Code : BTCS 402

Paper ID : [A2305]

Time : 3 Hrs.   **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Answer briefly :

1. Define an equivalence relation. Give an example.
2. If $A \subset B$ then show that $A^c \subset B^c$ where A and B are any two sets.
3. State the boundedness law of Boolean algebra.
4. When a ring is said to be without zero divisor?
5. Write the generating function corresponding to the numeric function,

$$a_n = 2^n + 3^n,\ n \geq 0.$$

6. Give an example of a finite group.
7. Under what condition or conditions, a non empty subset H of a finite group G is its subgroup.
8. Find the chromatic number of the graph, $K_{2,3}$.
9. Define a Hamiltonian cycle.
10. Define a graph. When it is said to be connected?

SECTION-B

11. Let A =(1,2,3,6}. Define a relation R on A as a R b iff a divides b. Show that R is a partial order.

12. Show that the intersection of two right ideals of a ring is again a right ideal of the ring.

13. Solve the recurrence relation, $a_n = 2a_{n-1} - a_{n-2}$, $n \geq 2$ with the initial conditions : $a_0 = 1, a_1 = 4$.

14. Prove that a group G each of whose elements other than identity is of order 2 is abelian.

15. Show that a connected graph G with e = v -1 is a tree.

SECTION-C

16. Let a, b be elements of a Boolean algebra then show that, $(a \wedge b)' = a' \vee b'$

17. Let H be a subgroup of a group G then prove that the relation

$R = \{(x, y) : x, y \in G,\ x^{-1}y \in H\}$ is an equivalence relation.

18. Check if the following graphs are isomorphic or not.